Science 8

FINAL EXAM REVIEW - **KEY**

Name: _____ Date: _____ Block: _____

Answer as many questions as you can without looking them up. This will show you how much you already know. Once you have filled in all that you can, use your text book and notebook to fill in the rest. Use your completed sheets to study!!!!! You can also check out the Unit Reviews at the end of each unit.

Unit A – Cells and Systems

Chapter 1 – Cells

1. List the 6 characteristics of living things.
   Living things: a) are composed of cells; b) reproduce, grow, and repair themselves; c) require energy; d) respond to the environment; e) have a life span; f) produce waste

2. What is the cell theory?
   All living things are composed of one or more cells and all new cells arise only from cells that already exist

3. Name the structures found in animal cells, as well as stating the function of each structure (seen with either a compound or electron microscope).

Cell Structure	***Description***
Nucleus	*control center of the cell and is surrounded by a membrane*
Chromosomes	*contain DNA, genetic information to pass on to other cells*
Cell Membrane	*holds contents of cell in place; made up of fat molecules; controls movement in and out of cell*
Cytoplasm	*fluid containing everything inside the cell membrane and outside the nucleus; allows transport of materials; stores wastes*
Vacuole	*stores water, nutrients, and waste; moves waste and excess water out of the cell; very large in plant cells*
Flagellum	*whip-like tail that helps cells move; not found on all animal cells*
Cilia	*tiny hairs that work to move a cell or fluid around a cell; not found on all animal cells*
Mitochondria	*"power plant" of cell; provide cells with energy through cellular respiration*
Ribosomes	*use info. from the nucleus and cytoplasm to produce proteins*
Endoplasmic Reticulum	*both types carry material through the cytoplasm; "rough" has ribosomes attached; "smooth" has no ribosomes attached and is where fats are made*

Golgi Apparatus	*stores and puts proteins into vesicles that carry them to the cell surface where they are released*
Lysosomes	*burst to destroy damaged/worn out cells; break down larger molecules into smaller ones; patrol and clean cytoplasm*

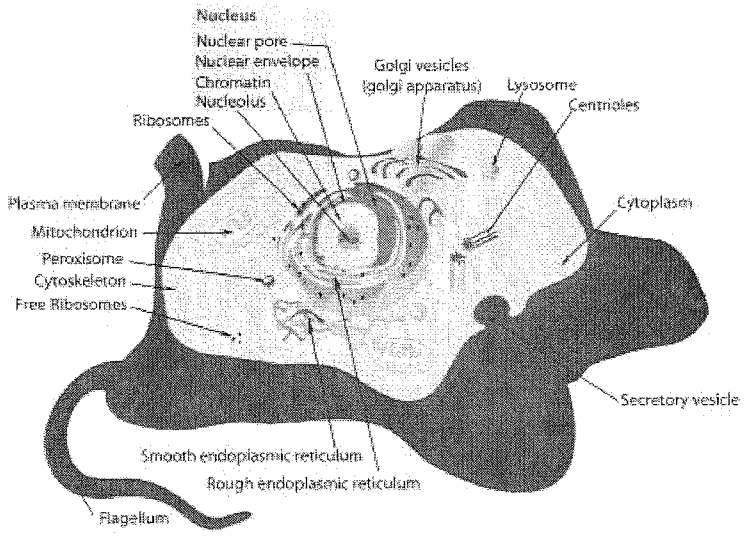
4. Name the structures found in plant cells, as well as stating the function of each structure (seen with either a compound or electron microscope).
   Same as for #3, except no flagellum or cilia and also:

Cell Structure	***Description***
Cell Wall	*protects and supports the plant cell; allows gases, water and some minerals to pass*
Chloroplasts	*contain chlorophyll; allow plant cells to make food using light, CO_2 and H_2O; found in the cells of the green parts of a plant*

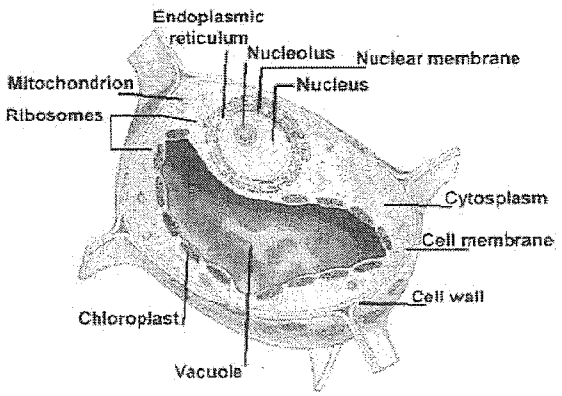
5. What are the differences between plant and animal cells?
   Plant cells have a cell wall and chloroplasts and also have a much larger vacuole.

6. Know how to label and differentiate between plant and animal cell diagrams.

ANIMAL



PLANT



7. What is a flagellum and cilia?
   A flagellum is a whip-like tail found on some animal cells that helps them move. Cilia are tiny hairs found on some animal cells that work to move a cell or fluid around a cell.

8. What is an organelle?
   A tiny structure found in the cytoplasm of both plant and animal cells. This includes mitochondria, ribosomes, endoplasmic reticulum, golgi apparatus, and lysosomes.

9. Describe the difference between permeable, selectively permeable, and impermeable cell membranes. What type of membrane do cells have and why?
A permeable cell membrane would let any and all materials enter or leave the cell while an impermeable membrane would not allow anything to leave or enter. Cell membranes are selectively permeable, meaning that they allow certain substances to enter or leave, but not others. It is important that cell membranes be selectively permeable since the level of substances in the cell such as water and nutrients needs to be controlled while other substances that could harm the cell need to be denied entry.

10. Explain the process of diffusion.
Diffusion is the movement of molecules from an area of high concentration to an area of low concentration. (Remember: there is a natural tendency for things to even themselves out.)

11. Explain the process of osmosis.
Osmosis is a special case of diffusion that involves water moving through a selectively permeable membrane.

12. How are osmosis and diffusion different? How are they the same?
Osmosis and diffusion are the same in that both processes involve a movement from high to low concentration. They are different in that osmosis involves <u>water</u> molecules moving across a <u>selectively permeable membrane</u> whereas diffusion just involves any sort of molecule moving from any location to another.

13. What determines the direction of water movement into or out of cells?
If there is a high concentration of solutes (dissolved substances), thus a low concentration of water, inside the cell then more water will move in. If there is a low concentration of solutes, thus a high concentration of water, inside the cell then water will move out. It is the concentration of solutes in the cell that determines water movement.

14. What is turgor pressure?
Turgor pressure is the pressure created inside a plant cell when water molecules enter the cell by osmosis and fill the vacuoles and cytoplasm. This causes them to swell up and push against the cell wall. This is an advantage for a plant cell since turgor pressure prevents more water from entering and thus the cell cannot burst. Animal cells do not have a cell wall so do not have this protection and can burst.

Chapter 2 – Cells and Cell Systems

1. State the levels of organization starting from a cell to organ system.
Cell, tissue, organ, organ system.

2. What are unicellular organisms or micro-organisms?
Tiny organisms that are composed of only one cell, such as bacteria, protists, and some fungi. These are only visible under a microscope.

3. State characteristics of bacteria, protists (diatoms, euglena, amoebae, and paramecia), and fungi.
   - Bacteria: most plentiful organisms; no nucleus, ribosomes, or mitochondria; usually have pili (hairlike structures that help them grab onto things) and a flagellum; have a capsule (sticky protective coating) and a cell wall
   - Protists: neither plants nor animals; eukaryotic (have a nuclear membrane); found wherever there is water or moisture
      - Diatom: plant-like protist; has chlorophyll; encased in thin shells
      - Euglena: plant-like protist; has chlorophyll; can produce own food or in the absence of sunlight can feed on other cells
      - Amoebae: animal-like protist; move and feed by stretching out a part of cytoplasm called a pseudopod ("false foot")
      - Paramecia: animal-like protist; use cilia to move and draw food into oral groove
   - Fungi: can be unicellular or multicellular; depend on other organisms for their food; include mould, mushrooms, yeast, etc.

4. Explain why cells need to be small instead of large to perform properly. Discuss surface area and volume relationships.
   In small cells, messages passed to the nucleus will take less time so these cells can react more quickly than larger cells. Many smaller cells that take up the same volume as one large cell will altogether have a larger surface area and thus more cell membrane. This is an advantage because more cell membrane means more areas for nutrients and wastes to enter/leave so the cell is more efficient.

5. What is a disease? What is an infection?
   A disease is any condition that is harmful to or interferes with the well-being of an organism. An infection is the action of disease-producing organisms, which invade the body and interfere with the normal activities of cells.

6. What types of invaders cause infection in humans? Give examples of each.
   Bacteria such as those that cause tetanus, strep throat, pneumonia, food spoilage, and contamination of drinking water; fungi such as athlete's foot; protists such as those that cause malaria and beaver fever; viruses (non-living invaders) such as those responsible for colds, cold sores, influenza, HIV/AIDS.

7. State two ways in which white blood cells protect the body from diseases.
   WBCs can either engulf and digest invaders or can produce antibodies that lock onto invading organisms (or onto the toxins they produce) to prevent them from interfering with and damaging the body's cells.

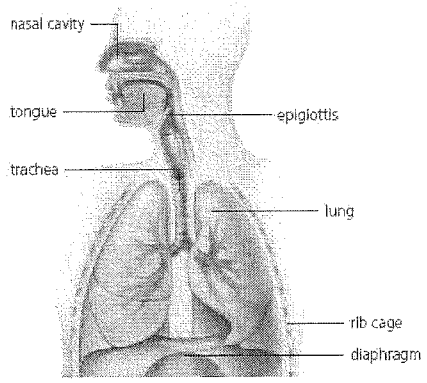
Chapter 3 – Human Body Systems

1. What is respiration? What is your respiratory system?
   Respiration is the process by which animals take in oxygen and release carbon dioxide. Your respiratory system is responsible for absorbing oxygen and

removing carbon dioxide from your blood. Its main components are the trachea, lungs, and diaphragm.

2. What is the difference between respiration and breathing?
   Breathing is the regular movement of air into and out of your lungs, whereas respiration is the process that occurs at the cellular level: the exchange of oxygen and carbon dioxide taking place in the alveoli of the lungs.

3. What are the main structures of the respiratory system? Draw and label a diagram with these structures.
   The main structures of the respiratory system are the trachea (hard, rigid tube leading to lungs), the lungs, and the diaphragm (sheet of muscle that contracts and relaxes to either bring air in or push air out of the lungs). Other structures include the bronchi (small tubes that branch off trachea and deliver air to lungs), the alveoli (small air sacs where oxygen and carbon dioxide diffuse in/out of blood), and the epiglottis (covers the opening of the trachea when you swallow to prevent food from going down the wrong way).



4. How do the lungs draw in air (inhale) and push air out (exhale)?
   When the diaphragm and rib muscles contract, the chest cavity volume increases and air is forced into the lungs (inhalation). When these muscles relax, the chest cavity volume decreases and air is forced out of the lungs (exhalation).

5. What occurs in the alveoli (air sacs)?
   The alveoli are where the exchange of oxygen and carbon dioxide takes place. These are surrounded by tiny blood vessels so that oxygen can diffuse into the blood and carbon dioxide can diffuse out.

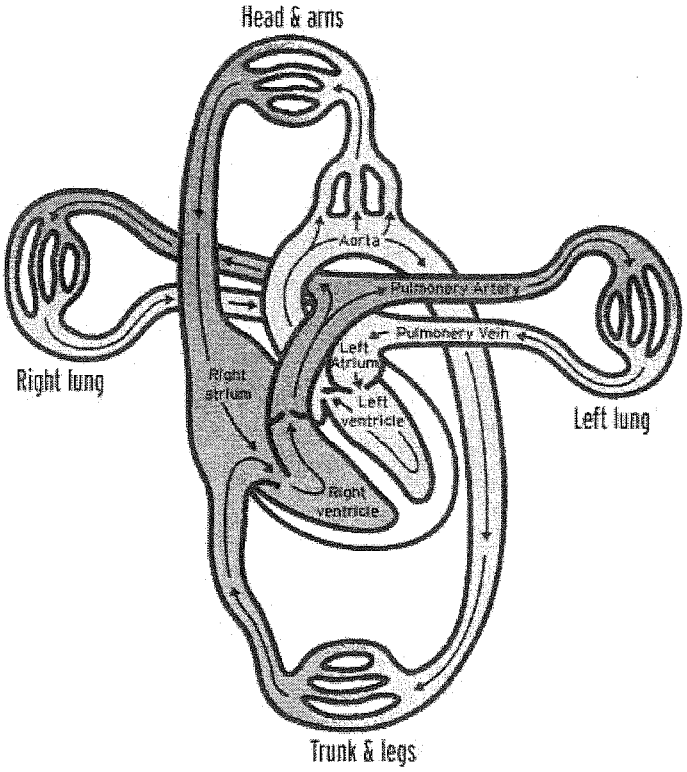
6. What is your circulatory system?
   The circulatory system is responsible for delivering oxygen and nutrients to the cells of your body. It also picks up carbon dioxide and other cell wastes so that they can be eliminated from the body.

7. Which blood vessels carry blood away from the heart? Which blood vessels carry blood to the heart? Where does nutrient and waste exchange occur?
   Arteries carry blood away from the heart, while veins carry blood to the heart. Nutrient and waste exchange occur in the capillaries.

8. What is deoxygenated blood? What is oxygenated blood?
   Deoxygenated blood is blood carried by veins and has little or no oxygen. This occurs after the oxygen has diffused into a cell. Oxygenated blood is blood carried by arteries and is rich in oxygen. This occurs after blood picks up oxygen in the lungs.

9. Draw a diagram that shows the movement of blood through the four chambers (label) of the heart. Explain the movement of blood.

   Movement: ....→ RA → RV → lungs → LA → LV → body →....



10. Explain the role of valves in the heart.
    Valves keep blood flowing in one direction in the heart (and also in the veins). They are found between the atria and the ventricles, and the ventricles and the arteries.

11. What is excretion? What is the excretory system?
    Excretion is the process of eliminating waste materials from the body. The excretory system removes cellular wastes other than carbon dioxide (removed by respiratory system) and solid wastes (removed by digestive system) from our body.

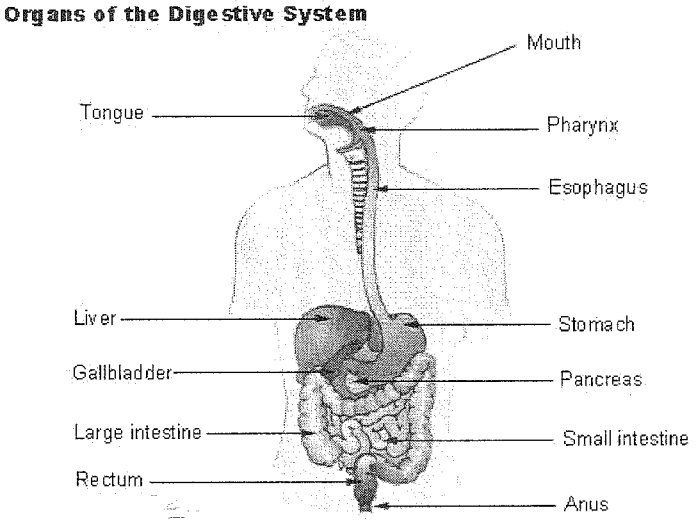
12. List the main parts of the excretory system.
    The main parts of the excretory system include the kidneys (contain nephrons where wastes are dissolved and carried to the ureters), ureters (tubes to the

bladder), bladder (where urine is stored), and urethra (where urine is excreted from body).

13. What is digestion? What is your digestive system?
Digestion is the process the body uses to break down large food molecules into smaller molecules used for energy and growth/repair. The digestive system breaks down our food into the nutrients that our body needs to survive.

14. What are enzymes?
Enzymes are chemicals that help to speed up digestion.

15. List the main parts of the digestive system. Draw, label and state the function of each part of the digestive system.
- mouth: chews food to break it into smaller pieces
- salivary glands: produce saliva that moistens food and contains enzymes that digest starch
- epiglottis: flap that covers opening of trachea to prevent food from entering lungs
- esophagus: passes food to the stomach
- stomach: secretes acidic gastric juices that start to break down proteins in food
- small intestine: about 6-7 metres long and when food enters, two organs release chemicals to help in digestion:
    - pancreas: secretes fluid that neutralizes acid from stomach and further digests proteins, carbohydrates, and fats
    - liver: produces bile to break down fats and stores the bile in the gall bladder
- large intestine: about 1.5 metres long and is where water is reabsorbed and fibre and other waste materials that were not digested are stored
- rectum and anus: where waste material is stored and eliminated from



16. What is a pathogen?
A pathogen is a micro-organism that causes disease by interfering directly with cells or producing harmful toxins.

17. What is the body's first line of defense?
The body's first line of defense consists of physical barriers such as our skin, nostril hairs, ear wax, tears, mucus in mouth/nose/trachea, and cilia in the trachea.

18. What is the body's second line of defense?
The second line of defense consists of white blood cells, which are attracted to the area of infection (usually a break in the skin) and can engulf and digest invaders.

19. Which system is called into action when a pathogen gets past the first two lines of defense? What occurs?
The immune system is called into action when the first two lines of defense are breached. This causes an immune response. The invaders produce a specific antigen which signal the body to make suitable antibodies. The antibodies can attach directly to the invader, preventing it from attacking cells, or can latch onto toxins produced by the invader.

20. Explain two ways that we become immune to diseases.
We can become immune to a disease after we have been exposed to it and our body has made the appropriate antibodies. We can also obtain a vaccination, which contains weakened or dead pathogens and causes our immune system to produce antibodies.

Unit B – Forensics

- You will not be asked any questions from this unit.

Unit C – Optics

Chapter 10 – Light Energy and Its Sources

1. What is light? How does light travel to your eyes?
Light is a form of energy that can be detected by our eyes. It can travel directly from a source to your eye or indirectly by bouncing off objects first then travelling to your eye.

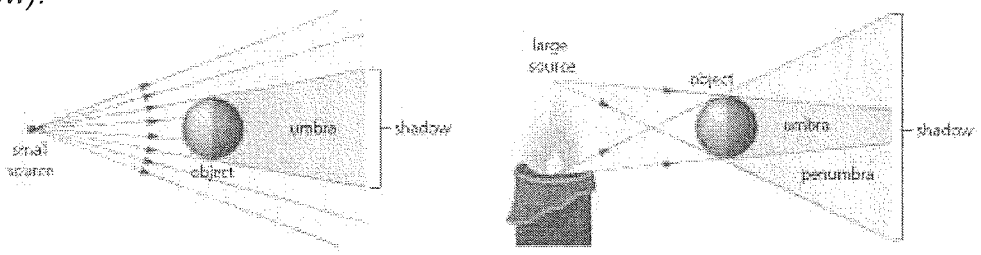
2. What is the difference between luminous and nonluminous objects?
Luminous objects emit light (eg. the Sun) while nonluminous objects don't emit light, but rather reflect it from other sources (eg. a book).

3. What is incandescent light? What is phosphorescent light? What is electric discharge light? What is fluorescent light? What is chemiluminescent light?
Incandescent light is light emitted due to an object having a very high temperature (eg. incandescent light bulb). Phosphorescent light is light given off by an object containing phosphors, which emit light after receiving and storing energy from another source (eg. glow-in-the-dark objects). Electric discharge light is light emitted due to electricity passing through a gas (eg. neon lights).

Fluorescent light is light given off by an object that receives energy from another source (eg. fluorescent tube lights). Chemiluminescent light is light that comes from chemical energy (eg. glowsticks).

4. What is the difference between phosphorescent light and fluorescent light?
   Phosphorescent light can continue to be produced for a time after the energy source is removed, while fluorescent light is emitted only when the energy source is available.

5. Explain what types of shadows you get from a small source and from a large source. Draw a diagram of each type and label the umbra and penumbra.
   A small light source will produce an umbra (dark part of the shadow), while a large light source will produce both an umbra and a penumbra (lighter part of a shadow).



6. What is transparency? Give some examples of transparent, translucent, and opaque materials.
   Transparency is a measure of how much light can pass through a material. An example of a transparent material is plastic wrap since light can pass through easily and a clear image is produced. Frosted glass is a translucent material since some light is transmitted and some is reflected, so that a clear image is not produced. Wood is an opaque material since all of the light is either absorbed or reflected, so that no light can pass through.

7. State 3 things that affect how light is absorbed or reflected.
   Colour, sheen, and texture describe the amount of light absorbed or reflected. A darker-coloured object will absorb more light than a lighter object, which will reflect more light. Dull materials like wood absorb more light than shiny materials like aluminum, which reflect more light. Rough-surfaced materials like stucco absorb more light than smooth-surfaced ones like plaster, which also reflect more light.

8. What is the visible spectrum? How was the composition of white light discovered?
   The visible spectrum is the part of the electromagnetic spectrum representing visible light. It consists of the colours visible in the rainbow. It was discovered by Isaac Newton, who passed a beam of sunlight (white light) through a prism that separated the light into the colours of the rainbow. He also collected these colours with a second prism to produce white light again.

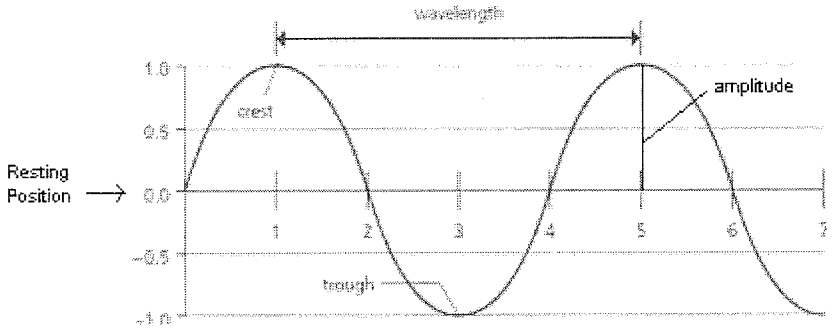
9. How do we see colours? What are the colours that make up white light?

Colours are seen when an object reflects a certain colour(s) of the visible spectrum while absorbing all the rest. We see the object as the particular colour (or combination of colours) reflected. If all the colours are reflected, then we see an object as white. The colours that make up white light are red, orange, yellow, green, blue, indigo, and violet (ROY G BIV).

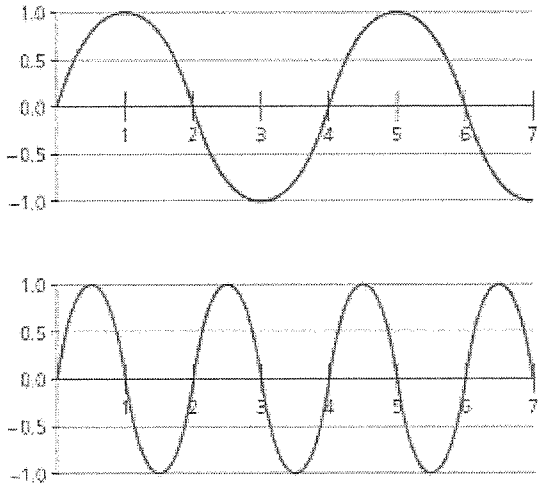
10. What is the electromagnetic spectrum? List the 7 types of waves in order of lowest energy to highest energy.
The electromagnetic spectrum is the entire range of electromagnetic waves, from radio waves to gamma rays. The seven types of waves from lowest to highest energy are radio, microwaves, infrared radiation (IR), visible light, ultraviolet radiation (UV), x-rays, and gamma rays.

11. Relate wavelength or frequency to the energy of the different parts of the electromagnetic spectrum.
Waves with very low energy, such as radio waves, have very long wavelengths and very low frequencies. Waves with high energy, such as gamma rays, have very short wavelengths and very high frequencies.

12. Draw a simple sketch of waves to illustrate the meanings of the terms wavelength, crest, trough, amplitude, and frequency.

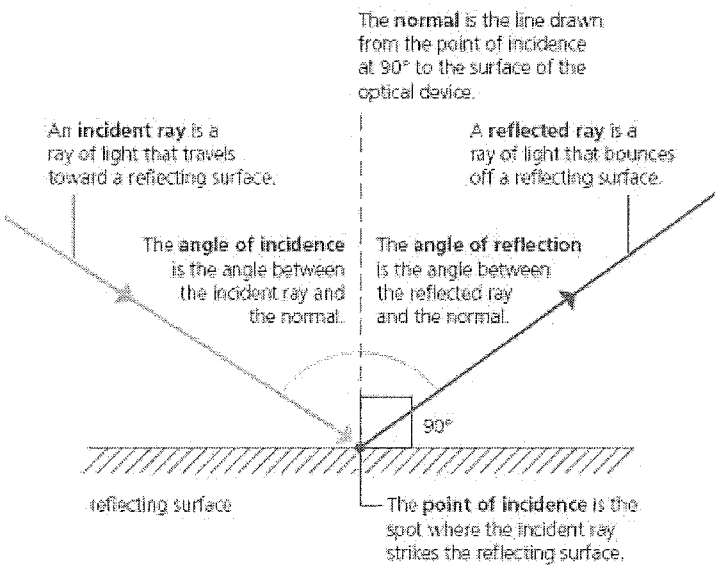


Frequency is the number of wavelengths in a period of time. For the waves below, the frequency of the bottom wave is twice that of the top wave since there are twice as many wavelengths in the same time period.



Chapter 11 – Mirrors and Lenses

1. Draw a diagram of an incident ray hitting a plane mirror and reflecting off in the opposite direction. Make sure you label the incident ray, reflected ray, angle of incident, angle of reflection, the normal, and the point of incidence.



2. What are the laws of reflection?
   The laws of reflection are that the angle of incidence equals the angle of reflection, and the incident ray, normal, and reflected ray all lie in the same plane.

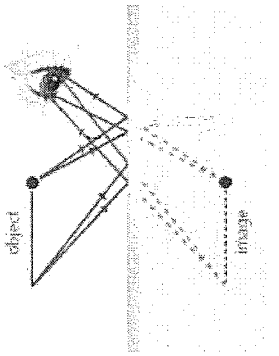
3. Explain the difference between specular and diffuse reflection. Which one produces an image?
   Specular reflection is the reflection of light off a smooth, shiny surface. It produces an image. Diffuse reflection is when light hits an irregular surface and scatters in many directions so that a reflected image is not formed.

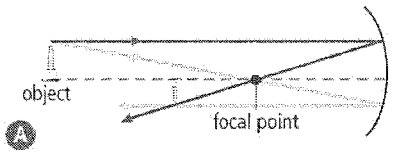
4. What is an optical device? Give some examples.
   An optical device is a device that produces an image of an object. Examples include mirrors, magnifying glasses, microscopes, telescopes, your eyes, a camera, etc.

5. What is the difference between real and virtual images?
   A real image can be placed on a screen (the light rays converge) and can be seen without looking at or through an optical device. A virtual image cannot be placed on a screen (the light rays diverge) and must be seen by looking at or through an optical device.

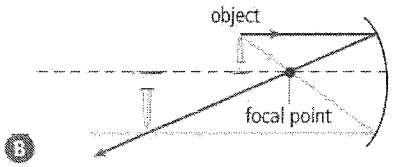
6. Refer to Table 1 on page 328 and know the principles of producing an image on each mirror. Also, draw a sketch for each mirror, showing where an image is produced.

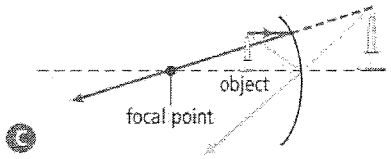
- *Plane mirror: image same size as object, upright, virtual (behind mirror)*



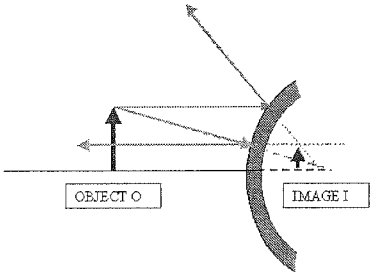


- *Concave mirror (beyond focal point): image smaller if object really far away from mirror or larger if object just beyond focal point, inverted, real (in front of mirror)*
- *Concave mirror (within focal point): image larger than object, upright, virtual (behind mirror) *This is how we mainly use concave mirrors.*



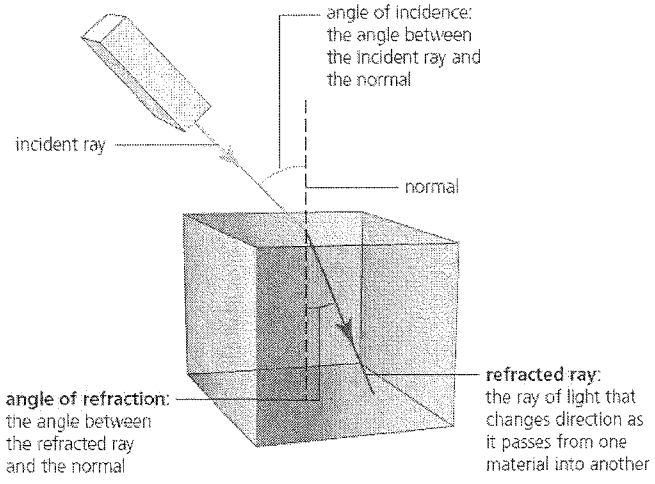


- *Convex mirror: image smaller than object, upright, virtual (behind mirror)*



7. What are some devices that use curved mirrors?
   Makeup and shaving mirrors, flashlights, spotlights, and car headlights use concave mirrors. Security, rear-view, and side-view mirrors use convex mirrors.

8. What is refraction? Draw a diagram showing an incident ray hitting a medium. Make sure you label the angle of refraction and refracted ray.
   Refraction is the bending of light as it travels from one material into another.



9. What is a lens? What are some devices that use lenses?
   A lens is a curved, transparent device that causes light to refract as it passes through. Microscopes and magnifying glasses use convex lenses. Some types of telescopes use concave lenses. Eyeglasses use either type.

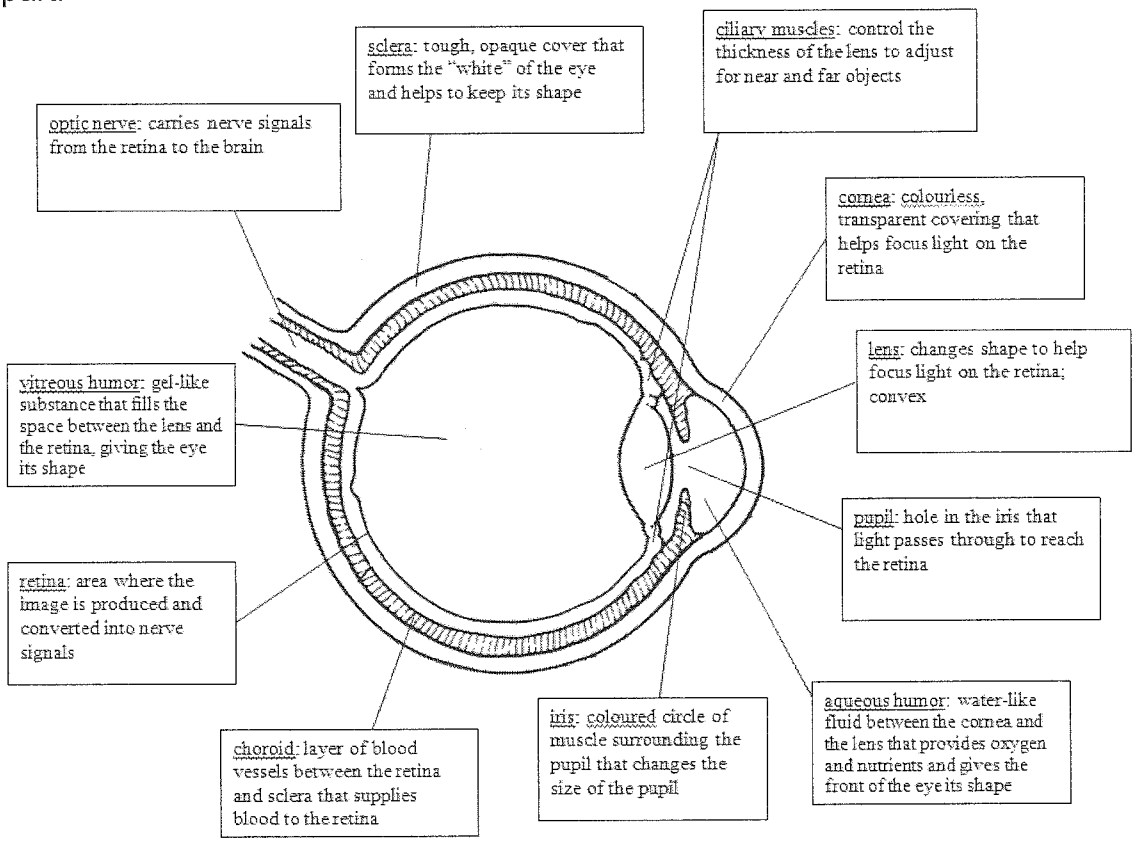
10. Why does light refract?

The speed of light changes when it enters another material. This causes the light to change direction, or refract.

11. Describe the attitude and approximate size of an image when an object is very close to and far away from a convex lens and a concave lens. Draw a diagram of the image formed by a concave and a convex lens.
See answer to question #6.

Chapter 12 – Light and Vision

1. Draw a simple sketch of the human eye. Label and state the function of each part.



2. How does light enter the eye? How does the iris control the amount of light entering the eye?
Light enters through the cornea then passes through the pupil and the lens. It is focused (refracted) onto the retina by the cornea (mainly) and the lens. The iris expands (dilates) the pupil to allow more light to enter, or shrinks (contracts) it to reduce the amount of light entering.

3. Explain how the ciliary muscles control how the eye focuses light. Explain what happens when the eye focuses on a distant object. Explain what happens when the eye focuses on nearby objects.

The ciliary muscles relax to focus on a distant object so that the lens is in its "normal" shape. They contract to focus on nearby objects so that the lens is thicker ("fatter") and refracts the light more.

4. Where is an image produced in the eye? What is located on this area? Is the image up right or inverted?
   An image is produced on the retina of the eye. The retina contains the light-receptor cells (rods for the level of light and cones for colour) that change light into nerve signals. The image is inverted (but your brain turns it right-side up).

5. What sends the nerve signal produced by the rods and cones to the brain?
   The optic nerve sends the nerve signals to the brain.

6. Explain how the blind spot is produced.
   The blind spot is produced because there is an area where the optic nerve and blood vessels connect to the retina. Here, there are no rods or cones so there is no nerve signal to send to the brain.

7. What is normal vision?
   Normal vision is 20/20 vision. This means that a person standing 20 feet away from the Snellen Eye Chart can see the detail that most people can see at this distance.

8. What is myopia and how is it corrected?
   Myopia (nearsightedness) is when nearby objects can be seen clearly but distant objects are out of focus. The light rays converge in front of the retina so that a clear image is not produced. It is caused by the eyeball being too long or the cornea/lens refracting light too much. Concave lenses are used to correct myopia, since they spread light apart more before entering the eye.

9. What is hyperopia and how is it corrected?
   Hyperopia (farsightedness) is when distant objects are seen clearly but nearby objects are out of focus. The light rays converge behind the retina so that a clear image is not produced. It is caused by the eyeball being too short or the cornea/lens refracting light too little. Convex lenses are used to correct myopia, since they refract the light slightly more before entering the eye.

10. What is astigmatism and presbyopia?
    Astigmatism is a condition in which the cornea is curved more in one direction so that light is focused on two or more focal points and vision is blurred. Presbyopia is the inability to focus on either near or far objects and occurs with age as the lens and cornea lose their elasticity.

11. List some corrective measures for refractive vision problems.
    Eyeglasses, contact lenses, and laser eye surgery.

12. Which sensory receptor detects colours in our eyes? Which colours does it detect?

The cones in our eyes detect colours. There are cones to detect red, green, and blue light. This is enough to see all of the colours of the rainbow.

13. What are the primary light colours and the secondary light colours?
The primary light colours are red, green, and blue. The secondary colours are yellow (red + green), cyan (green + blue), and magenta (red + blue).

14. What are complementary light colours? What do they produce?
Complementary light colours are any two colours of light that produce white light when added together: red + cyan, green + magenta, blue + yellow.

Unit D – Fluids

Chapter 4 – Properties of Fluids

1. What are some unique properties that fluids have?
Fluids can flow; fluids can be thick or thin; some objects float better in one fluid than another; and some objects sink in one fluid but not in another.

2. What is flow rate?
Flow rate is how quickly a fluid flows in a given amount of time.

3. State the kinetic molecular theory. What are the three main points?
All matter is made up of small particles; these particles are in constant motion; there are forces of attraction between particles.

4. What are the three states of matter? Explain how increasing or decreasing temperature will affect each state. Use words such as melting, evaporation, condensation, solidification and sublimation.
The three states of matter are solid, liquid, and gas. Increasing the temperature of a substance causes its particles to gain energy, increase their motion, and thus decrease their forces of attraction. If enough energy is added, the substance will change state. A solid can change into a liquid (melting), a liquid to a gas (evaporation), or a solid directly to a gas (sublimation). Decreasing the temperature of a substance causes its particles to lose energy, decrease their motion, and thus increase their forces of attraction. A gas can change to a liquid (condensation), a liquid to a gas (solidification), or a gas directly to a solid (sublimation or deposition).

5. What is viscosity?
Viscosity is the resistance of a fluid to flowing and movement (eg. ketchup is very viscous, whereas water has low viscosity).

6. What is cohesion? What is adhesion? What is surface tension? How are they related to viscosity?
Cohesion is the attractive forces among the particles of a substance. Adhesion is the attractive force between fluid particles and particles of <u>another</u> substance. Surface tension is the increased attraction among the particles at the surface of a

fluid. Cohesion is related to viscosity in that the higher the cohesion of particles, the higher the viscosity and vice versa. Adhesion can cause a substance to be more viscous if its particles tend to be attracted to their container. Surface tension causes liquids to be slightly more viscous at their surface than deeper in the liquid.

7. How do you measure viscosity? What are some viscous substances?
   Viscosity is measured with an instrument called a viscometer. Viscous substances include ketchup and molasses.

8. What is weight? What is mass? How are they different?
   Weight is a measurement of the force of gravity pulling on an object. Mass is the amount of matter in an object. They are different in that your mass will be the same anywhere in the universe (you still have the same amount of matter in you!) but your weight depends on the force of gravity (different in different places in the universe).

9. What are the units of mass?
   Mass is usually measured in units of kilograms (kg) or grams (g).

10. How you can directly and indirectly measure mass?
    The mass of a solid can be measured directly by placing it on a balance or scale. The mass of a liquid must be measured indirectly by first measuring the mass of the empty container and subtracting this from the mass of the container and liquid together.

11. What is volume? What are the units of volume?
    Volume is the amount of space occupied by an object. It is typically measured in mL, L, cm^3 or m^3.

12. How you can directly and indirectly measure volume?
    The volume of a liquid can be measured directly using a graduated cylinder or other suitable container. The volume of a regular solid can be found by measuring with a ruler and calculating (V = l x w x h). The volume of an irregular solid must be measured indirectly by using displacement of water (find volume of water then subtract this from the volume of the water and object together).

13. What is the meniscus?
    The meniscus is the curve at the edges of the surface where the liquid touches the container.

14. What is the formula for the volume of rectangular solids?
    Volume = length x width x height

15. What is density? What is the formula for density? What are the units?
    Density is the mass of substance (m) per unit volume of the substance (V). D = m / V. The units are usually g/mL (liquids) or g/cm^3 (solids).

16. Explain how objects float or sink in another object.
If the density of an object is less than that of the fluid it is in, then the object will float. If the density of the object is more than that of the fluid it is in, then it will sink.

17. What is the density of a piece of wood that has a mass of 25.0 grams and a volume of 29.4 cm^3?
$D = m / V = 25.0 / 29.4 = 0.85\ g/cm^3$.

18. A piece of wood that measures 3.0 cm x 6.0 cm x 4.0 cm has a mass of 80.0 grams. What is the density of the wood? Would that piece of wood float in water? (V = l x w x h)
$V = L \times W \times H = 3.0 \times 6.0 \times 4.0 = 72\ cm^3$
$D = m / V = 80.0 / 72 = 1.11\ g/cm^3$
The piece of wood would not float in water, since its density is more than that of water ($1.0\ g/cm^3$).

19. A cup of gold coloured metal beads was measured to have a mass of 425.0 grams. By water displacement, the volume of the beads was calculated to be 48.0 cm^3. Given the following densities, identify the metal.

Gold:	19.3 g/ml
Copper:	8.86 g/ml
Bronze:	9.87 g/ml

$D = m / V = 425.0 / 48.0 = 8.85\ g/cm^3$
The metal is copper.

20. What are three properties of fluids?
Three properties of fluids are density, viscosity, and buoyancy (buoyant force).

21. What is buoyancy?
Buoyancy is the upward force that a fluid exerts on an object.

22. What is Archimedes's principle?
Archimedes' Principle states that an object immersed in a fluid will have an upwards buoyant force on it equal to the weight of the displaced fluid. In other words, the more fluid that is displaced by an object, the greater the buoyant force.

23. What is positive buoyancy? What is neutral buoyancy? What is negative buoyancy?
Positive buoyancy is the tendency of an object to float or rise in a fluid because it weighs less than the fluid it displaces. Neutral buoyancy is the tendency of an object to remain at a constant level because it weighs the same as the fluid it displaces. Neutral buoyancy is the tendency of an object to sink in a fluid because it weighs more than the fluid it displaces.

24. How does temperature affect viscosity? Density? Volume? Buoyancy?
Generally, as temperature increases, viscosity decreases, density decreases, volume increases, and buoyancy decreases. These changes occur because the spaces between the particles increase and the attraction between the particles decreases. As temperature decreases, viscosity increases, density increases, volume decreases, and buoyancy increases. The spaces between the particles decrease and the attraction increases.

Chapter 5 – The Use of Fluids & Chapter 6 – Fluids and Living Things

1. What is force? What are the units for force?
Force is a push or pull that acts on an object. The units are newtons (N).

2. What is pressure? What is the formula for pressure? What are the units for pressure?
Pressure (P) is the amount of force (F) per unit of area (A). P = F / A. The unit is the pascal (Pa) which is 1 N/m^2.

3. Calculate the pressure if you have a force of 600 N acting on an area of 150 cm^2.
P = F / A = 600 / 150 = 4 N/cm^2

4. If a piston in a cylinder has a radius of 2.0 cm, calculate the pressure exerted if a person pushes down on the piston with a force of 10 N. $A = \pi r^2$
$A = \pi \times r^2 = 3.14 \times 2.0^2 = 3.14 \times 4.0 = 12.6\ cm^2$
P = F / A = 10 / 12.6 = 0.8 N/cm^2

5. What is the area if the pressure is 2.56 N/cm^2 and the force is 15 N?
A = F / P = 15 / 2.56 = 5.9 cm^2

6. What is the force if the pressure is 6.44 Pa and the area is 12 m^2?
F = P x A = 6.44 x 12 = 77.3 N

7. How do snowshoes help you walk across a snowy field?
Snowshoes distribute your weight over a larger area than a regular pair of shoes. This causes the pressure on the snow to be reduced, so you won't sink down as far into the snow.

8. What is atmospheric pressure? Does it increase or decrease as you get farther away from sea level?
Atmospheric pressure is the weight of the air pushing down on itself and on Earth's surface. As you increase your elevation above sea level, atmospheric pressure decreases.

9. What is water pressure? Does it increase or decrease as you go deeper into water?
Water pressure is the weight of the water pushing down on itself and on the bottom of the ocean. It increases as you go deeper into the water.

10. What are the parts of a hydraulic system? What are the parts of pneumatic system?
Parts of a hydraulic system include the hydraulic fluid, conductor(s), cylinders, pistons, pump(s), and valve(s). Pneumatic systems have conductor(s), cylinders, pistons, valve(s), and an air compressor.

11. Explain the difference between hydraulic and pneumatic systems.
Hydraulic systems use moving liquids to transmit forces whereas pneumatic systems use moving gases.

12. List two examples of hydraulic systems and two examples of pneumatic systems.
Hydraulic systems include car braking systems and hypodermic needles. Pneumatic systems include tire inflators and jackhammers.

13. Explain how the heart and the circulatory system act like a hydraulic system.
The circulatory system is a hydraulic system because it involves the movement of fluids under pressure in a closed system.The heart is the pump; the blood is the hydraulic fluid; the arteries, veins, and capillaries are the conductors; and the heart valves allow the blood to flow in only one direction.

14. Explain how the lungs act like a pneumatic system.
The respiratory system is a pneumatic system. The lungs act as the pump and the diaphragm as the piston.

15. How does temperature affect pressure?
If the volume of a fluid is held constant, an increase in temperature will cause an increase in pressure and a decrease in temperature will cause a decrease in pressure.

NOTE: All formulas will be provided, but make sure that you understand how to use them and what the correct units are for each.